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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/588,552	06/07/2000	Kazuhiro Kawashiri	P107317-00006	9166

7590 05/05/2004

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EXAMINER	
LONG, HEATHER R	

ART UNIT	PAPER NUMBER
2615	5

DATE MAILED: 05/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/588,552	KAWASHIRI, KAZUHIRO	
	Examiner	Art Unit	
	Heather R Long	2615	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *17 and 18* is/are allowed.

6)☒ Claim(s) *1-10, 13-16, and 19-20* is/are rejected.

7)☒ Claim(s) *11 and 12* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *04 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, see page 18: lines 6-23, filed on March 4, 2004, with respect to the rejection(s)of claim(s) 1-16 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of a different interpretation of the previously applied reference along with newly found prior art references.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claim 19 rejected under 35 U.S.C. 102(e) as being anticipated by Kijima et al. (U.S. Patent 6,661,451).

Regarding claim **19**, Kijima et al. discloses in Fig. 7 a solid state image pickup device comprising: a plurality of photoelectric conversion elements for converting light into electric charges; a plurality of vertical charge transfer paths, wherein each of the plurality of photoelectric conversion elements is coupled to a corresponding one of the plurality of vertical charge transfer paths, and each of

the plurality of photoelectric conversion elements coverts light into an electric charge; and at least one controller which is configured to: transfer a first electric charge from a first of the plurality of photoelectric conversion elements to the corresponding one of the plurality of vertical charge transfer paths via a first read gate; move the first electric charge in a predetermined direction within the corresponding one of the plurality of vertical charge transfer paths; and add a second electric charge from a second of the plurality of photoelectric conversion elements to the first electric charge by transferring the second electric charge to the corresponding one of the plurality of vertical charge transfer paths via a second read gate after the controller moves the first electric charge in the predetermined direction (col. 7, line 65 – col. 8, line 47).

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 1,13, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iizuka (U.S. Patent 5,287,192) in view of Ishigami (U.S. Patent 6,198,507).

Regarding claim **1**, Iizuka discloses in Figs. 1, 2, 3, and 4 a solid state image pickup device (7) comprising: a plurality of photoelectric conversion elements (1) for converting light into electric charges, the photoelectric conversion elements (1) being uniformly disposed on a two-dimensional plane in vertical and horizontal directions; a plurality of vertical charge transfer paths (3)

for transferring electric charges to a downstream side in the vertical direction, the vertical charge transfer path (3) being disposed adjacent to vertically and uniformly disposed photoelectric conversion elements (1); a read gate (2) for reading electric charges from each photoelectric conversion element (1) to the adjacent vertical charge transfer path (3); vertical addition means for adding electric charges of two photoelectric conversion elements (1) on the vertical charge transfer path (3), by controlling the read gates (2) and the vertical charge transfer path (3) to read electric charges from some of the plurality of photoelectric conversion elements (1) to the vertical charge transfer path (3), transfer the read charges on the vertical charge transfer path (3) to the downstream side in the vertical direction, and read electric charges from others of the plurality of photoelectric elements (1) on the downstream side to the vertical charge transfer path (3); a horizontal charge transfer path (5) for transferring electric charges to a downstream side in the horizontal direction, the horizontal charge transfer path (5) being disposed adjacent to one ends of the plurality of vertical charge transfer paths (3); and horizontal addition means for adding electric charges transferred from one vertical charge transfer path (3), on the horizontal charge transfer path (5), by controlling the transfer gate and the horizontal charge transfer path (5) to transfer electric charges from some of the plurality of vertical charge transfer paths (3) to the horizontal charge transfer path (5), transfer the electric charges on the horizontal charge transfer path (5) to the downstream side in the horizontal direction, and transfer electric charges from

others of the plurality of vertical charge transfer paths (3) on the downstream side to the horizontal charge transfer path (5). It is inherent that there is a transfer gate for transferring electric charges on the vertical charge transfer paths (3) to the horizontal charge transfer path (5) (col. 2, lines 34-53; col. 3, lines 39-60; and col. 4, lines 9-18). However, Iizuka differs from claim 1 in that claim 1 further requires the addition means to add electric charges transferred from two or more of the vertical charge transfer paths, on the horizontal charge transfer path.

Referring to the Ishigami reference, Ishigami discloses in Figs. 5 and 12A-12C a solid state image pickup device comprising a plurality of photoelectric conversion elements (1) for converting light into electric charges, the photoelectric conversion elements (1) being uniformly disposed in a two-dimensional plane in vertical and horizontal directions; a plurality of vertical charge transfer paths (2) for transferring electric charges to a downstream side in the vertical direction, the vertical charge transfer path (2) being disposed adjacent to vertically and uniformly disposed photoelectric conversion elements (1); a horizontal charge transfer path (4) for transferring electric charges to a downstream side in the horizontal direction, the horizontal charge transfer path (4) being disposed adjacent to one end of the plurality of vertical charge transfer paths (2); and horizontal addition means for adding electric charges transferred from two or more of the vertical charge transfer paths (2), on the horizontal transfer path (4), by controlling the transfer gate and the horizontal charge transfer path (4) to transfer electric charges from some of the plurality of vertical

charge transfer paths (2) to the horizontal charge transfer path (4), transfer the electric charges on the horizontal charge transfer path (4) to the downstream side in the horizontal direction, and transfer electric charges from others of the plurality of the vertical charge transfer paths (2) on the downstream side to the horizontal charge transfer path (4) (col. 14, line 41 – col. 15, line 25).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have combined the teachings of Ishigami and Iizuka to produce a solid state image pickup device that adds electric charges from more than one vertical charge transfer path in order to speed up the readout of an image by outputting a field image using only half as many scanning lines in the vertical direction.

Regarding claim **13**, Iizuka discloses in Figs. 1, 2, 3, and 4 a control method for a solid state image pickup device (7) having a plurality of photoelectric conversion elements (1) for converting light into electric charges, the photoelectric conversion elements (1) being uniformly disposed on a two-dimensional plane in vertical and horizontal directions, a plurality of vertical charge transfer paths (3) for transferring electric charges to a downstream side in the vertical direction, the vertical charge transfer path (3) being disposed adjacent to vertically and uniformly disposed photoelectric conversion elements (1), a horizontal charge transfer path (5) for transferring electric charges to a downstream side in the vertical direction, the vertical charge transfer path (3) being disposed adjacent to vertically and uniformly disposed photoelectric

conversion elements (1), a horizontal charge transfer path (5)for transferring electric charges to a downstream side in the horizontal direction, the horizontal charge transfer path (5) being disposed adjacent to one ends of the plurality of vertical charge transfer paths (3), the method comprising the steps of: (a) reading electric charges from some of the plurality of photoelectric conversion elements (1) to the vertical charge transfer path (3); (b) transferring the electric charges on the vertical charge transfer path (3) to a downstream side in the vertical direction; (c) reading electric charges from others of the plurality of photoelectric conversion elements (1) on the downstream side to the vertical charge transfer path (3) and adding the read electric charges to the electric charges transferred to the downstream side; (d) transferring electric charges from some of the plurality of vertical charge transfer paths (3) to the horizontal charge transfer path (5); (e) transferring the electric charges on the horizontal charge transfer path (5) to a downstream side in the horizontal direction; and (f) transferring electric charges from others of the plurality of vertical charge transfer paths (3) on the downstream side to the horizontal charge transfer path (5) and adding electric charges from a vertical charge transfer path (3) on the horizontal charge transfer path (5) (col. 2, lines 34-53; col. 3, lines 39-60; and col. 4, lines 9-18). However, Iizuka fails to disclose adding electric charges from two or more vertical charge transfer paths on the horizontal charge transfer path.

Referring to the Ishigami reference, Ishigami discloses in Figs. 5 and 12A-12C a control method for a solid state image pickup device having a plurality of

photoelectric conversion elements (1) for converting light into electric charges, the photoelectric conversion elements (1) being uniformly disposed on a two-dimensional plane in vertical and horizontal directions, a plurality of vertical charge transfer paths (2) for transferring electric charges to a downstream side in the vertical direction, the vertical charge transfer path (2) being disposed adjacent to vertically and uniformly disposed photoelectric conversion elements (1), a horizontal charge transfer path (4) for transferring electric charges to a downstream side in the horizontal direction, the horizontal charge transfer path being disposed adjacent to one end of the plurality of vertical charge transfer paths (2), the method comprising the steps of: (a) reading electric charges from some of the plurality of photoelectric conversion elements (1) to the vertical charge transfer path (2); (b) transferring the electric charges on the vertical charge transfer path to a downstream side in the vertical direction; (d) transferring electric charges from some of the plurality of vertical charge transfer paths (2) to the horizontal charge transfer path; (e) transferring the electric charges on the horizontal charge transfer path (4) to a downstream side in the horizontal direction; and (f) transferring electric charges from others of the plurality of vertical charge transfer paths (2) on the downstream side to the horizontal charge transfer path (4) and adding electric charges from two or more vertical charge transfer paths on the horizontal charge transfer path (4) (col. 14, line 41 – col. 15, line 25).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have combined the teachings of Ishigami and Iizuka to produce a solid state image pickup device that adds electric charges from more than one vertical charge transfer path in order to speed up the readout of an image by outputting a field image using only half as many scanning lines in the vertical direction.

Regarding claim **20**, Iizuka discloses a solid state image pickup device (7) comprising: a plurality of photoelectric conversion elements (1); a plurality of vertical charge transfer paths (3), wherein each of the plurality of photoelectric conversion elements (1) is coupled to a corresponding one of the plurality of vertical charge transfer paths (3), and each of the plurality of photoelectric conversion elements (1) coverts light into an electric charge and selectively transfers the electric charge to the corresponding one of the plurality of vertical charge transfer paths (3) via a read gate (2); at least one controller which generates at least one first combined electric charge within each of the plurality of vertical charge transfer paths (3) by selectively transferring a first electric charge to the vertical charge transfer path (3), moving the first electric charge in a predetermined direction within the vertical charge transfer path (3), and adding at least one second electric charge to the first electric charge after moving the first electric charge in the predetermined direction; and a horizontal charge transfer path (5), wherein each of the plurality of vertical charge transfer paths (3) is coupled to the horizontal charge transfer path (5), wherein at least one

controller further generates at least one second combined electric charge within the horizontal charge transfer path (5) by selectively adding at least one first combined electric charge from a first of the plurality of vertical charge transfer paths (3) to the at least one first combined electric charge from the same vertical charge transfer path (3) (col. 2, lines 34-53; col. 3, lines 39-60; and col. 4, lines 9-18). However, Iizuka fails to disclose adding charges from two different vertical charge transfer paths in the horizontal charge transfer path.

Referring to the Ishigami reference, Ishigami discloses a solid state image pickup device comprising: a plurality of photoelectric conversion elements (1); a plurality of vertical charge transfer paths (2), wherein each of the plurality of photoelectric conversion elements (1) is coupled to a corresponding one of the plurality of vertical charge transfer paths (2), and each of the plurality of photoelectric conversion elements (1) coverts light into an electric charge and selectively transfers the electric charge to the corresponding one of the plurality of vertical charge transfer paths (2); and a horizontal charge transfer path (4), wherein each of the plurality of vertical charge transfer paths (2) is coupled to the horizontal charge transfer path (4), wherein at least one controller further generates at least one second combined electric charge within the horizontal charge transfer path (4) by selectively adding at least one first combined electric charge from a first of the plurality of vertical charge transfer paths (2) to the at least one first combined electric charge from the a second of the plurality of vertical charge transfer paths (2) (col. 14, line 41 – col. 15, line 25).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have combined the teachings of Ishigami and Iizuka to produce a solid state image pickup device that adds electric charges from more than one vertical charge transfer path in order to speed up the readout of an image by outputting a field image using only half as many scanning lines in the vertical direction.

6. Claims 2-4 and 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iizuka in view of Ishigami as applied to claims 1 and 13 above, and further in view of Kijima et al. (U.S. Patent 6,661,451).

Regarding claim **2**, Iizuka in view of Ishigami differs from claim 2 in that claim 2 further requires a solid state image pickup device, wherein the plurality of photoelectric conversion elements can convert light of each of a plurality of colors into electric charges and the vertical charge transfer path adds electric charges of a same color. However, Ishigami does disclose a solid state image pickup device wherein the horizontal charge transfer path adds electric charges of a same color (col. 14, line 41 – col. 15, line 25).

Referring to the Kijima et al. reference, Kijima et al. discloses in Figs. 7 and 8 a solid state image pickup device, wherein the plurality of photoelectric conversion elements can convert light of each of a plurality of colors into electric charges and the vertical charge transfer path and the horizontal charge transfer path adds electric charges of a same color (col. 7, lines 60-69; col. 8, lines 17-47).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have combined the teachings of Kijima et al. and Iizuka in view of Ishigami and only have added electric charges of the same color together in both the vertical and horizontal charge transfer paths in order to create an image free from considerable moiré.

Regarding claim **3**, Kijima et al. discloses in Figs. 7 and 8 a solid state image pickup device, wherein the plurality of photoelectric conversion elements uniformly disposed in the vertical direction can convert light of each of at least two colors into electric charges; and the vertical addition means adds electric charges of a same color by controlling the read gate and the vertical charge transfer path to read electric charges from some of plurality of photoelectric conversion elements uniformly disposed in the vertical direction to the vertical charge transfer path by a first read operation, thereafter transfer the read electric charges in the vertical direction to positions adjacent to others of the plurality of photoelectric conversion elements on the downstream side capable of converting light of the same color not read by the first read operation into electric charges, and read the electric charges from the others of the plurality of photoelectric conversion elements by a second read operation to add the read electric charges transferred to the positions (col. 7, lines 60-69; col. 8, lines 17-47).

Regarding claim **4**, Kijima et al. discloses in Figs. 7 and 8 a solid state image pickup device, wherein the photoelectric conversion elements from which the electric charges are read by the second read operation are spaced at least by

one photoelectric conversion element in the vertical direction toward the horizontal charge transfer path, from the photoelectric conversion elements from which the electric charges are read by the first read operation (col. 9, lines 11-14).

Regarding claim **14**, Kijima et al. discloses in Figs. 7 and 8 a control method for a solid state image pickup device, wherein the plurality of photoelectric conversion elements can convert light of each of a plurality of colors into electric charges and the steps (c) and (f) adds electric charges of a same color (col. 7, lines 60-69; col. 8, lines 17-47).

Regarding claim **15**, Kijima et al. discloses a control method for a solid state image pickup device, wherein the plurality of photoelectric conversion elements uniformly disposed in the vertical direction can convert light of each of at least two colors into electric charges; step (b) transfers the read electric charges in the vertical direction to positions adjacent to others of the plurality of photoelectric conversion elements on the downstream side capable of converting light of the same color not read by step (a) into electric charges; and step (c) reads the electric charges from the others of the plurality of photoelectric conversion elements on the downstream side to add the read electric charges to the electric charges transferred to the positions (col. 7, lines 60-69; col. 8, lines 17-47).

Regarding claim **16**, Iizuka in view of Ishigami in view of Kijima et al. discloses a control method for a solid state image pickup device, wherein step (d)

transfer added electric charges of a same color from some of the plurality of vertical charge transfer paths to the horizontal charge transfer path; and step (f) transfers electric charges of the same color from others of the plurality of vertical charge transfer paths on the downstream side to the horizontal charge transfer path and adding the electric charges of the same color transferred from two vertical charge transfer paths (Iizuka: Figs. 2, 3, and 4; Kijima et al.: col. 9, lines 11- 14).

7. Claims 5-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iizuka in view of Ishigami as applied to claim 1 above, and further in view of Nakashiba (U.S. Patent 5,920,346).

Regarding claim **5**, Iizuka in view of Ishigami differs from claim 5 in that claim 5 further requires a solid state image pickup device, wherein the transfer gate includes a plurality of control gates extending in parallel in the horizontal direction, the plurality of control gates crossing the plurality of vertical charge transfer paths.

Referring to the Nakashiba reference, Nakashiba discloses in Figs. 5 and 6 a solid state image pickup device, wherein the transfer gate includes a plurality of control gates (11-13) extending in parallel in the horizontal direction, the plurality of control gates crossing the plurality of vertical charge transfer paths (6-1, 6-2) (col. 3, lines 17-21).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made combined the teachings of Nakashiba with

Iizuka in view of Ishigami in order to provide a two-dimensional CCD image sensor free from vertical black streaks.

Regarding claim **6**, Nakashiba discloses in Figs. 5 and 6 a solid state image pickup device, wherein the plurality of control gates (11-13) include a control gate which covers areas different in the vertical direction of one and another of the plurality of vertical charge transfer paths (6-1, 6-2).

Regarding claim **7**, Nakashiba discloses in Figs. 5 and 6 a solid state image pickup device, wherein the plurality of control gates (11-13) include a control gate which covers areas different in the vertical direction of one and another set of a plurality of vertical charge transfer paths (6-1, 6-2) adjacent in the horizontal direction.

Regarding claim **8**, Nakashiba discloses in Figs. 5 and 6 a solid state image pickup device, wherein the control gates (11-13) include a plurality of first and second layer polysilicon electrodes formed above the vertical charge transfer paths (6-1).

Regarding claim **9**, Nakashiba discloses in Figs. 5 and 6 a solid state image pickup device, wherein the plurality of second layer polysilicon electrodes (12) include a second layer polysilicon electrode formed only above the first layer polysilicon electrode (11, 13) above some of the plurality of vertical charge transfer paths (6-1).

Regarding claim **10**, Nakashiba discloses in Figs 5 and 6 a solid state image pickup device, wherein the plurality of first layer polysilicon electrodes (11,

13) include a first layer polysilicon electrode (11) having different lengths in the vertical direction above the different ones of the plurality of vertical charge transfer paths (6-1, 6-2).

Allowable Subject Matter

8. Claims 11 and 12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

9. The following is a statement of reasons for the indication of allowable subject matter:

a. The vertical charge transfer path includes a first conductivity type semiconductor layer for transferring electric charges accumulated in the photoelectric conversion element, a first vertical charge transfer path having second conductivity type semiconductor layers in the first conductivity type semiconductor layer for forming a potential barrier in two regions different in the vertical direction, and a second vertical charge transfer path having a second conductivity type semiconductor layer in the first conductivity type semiconductor layer for forming a potential barrier in one of the two regions on a downstream side; the transfer gate includes at least first to fourth control gates remoter in this order from the horizontal charge transfer path, the first to fourth control gates extending in the horizontal direction above the plurality of vertical charge transfer paths; the first and third control gates are formed above the first conductivity type

semiconductor layer; and the second and fourth control electrodes cross the first and second vertical charge transfer paths in the two regions (claim 11).

b. The second and third control electrodes are connected in common (claim 12 - dependent on claim 11).

10. Claims 17 and 18 are allowed.

11. The following is an examiner's statement of reasons for allowance:

a. The vertical charge transfer paths include a first region of a first conductivity type for transferring electric charges accumulated in the photoelectric conversion element, and the vertical charge transfer paths include a first vertical charge transfer path having second regions added with impurities of a second conductivity type in the first region for forming a potential barrier in two regions different in the vertical direction, and a second vertical charge transfer path having a second region added with impurities of the second conductivity type in the first region for forming a potential barrier in a region corresponding to one of the two regions on a downstream side. Also, the transfer gate for transferring electric charges of the vertical charge transfer paths to the horizontal charge transfer path includes at least first to fourth control gates remoter in this order from the horizontal charge transfer path, the first to fourth control gates extending in the horizontal direction above the plurality of vertical charge transfer paths, wherein the first and third control gates are formed above the first region, and the second and fourth control electrodes cross the first and second vertical charge transfer path in the two regions (claim 17).

b. The second and third control electrodes are connected in common (claim 18 – dependent on claim 17).

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a. Savoye et al. (U.S. Patent 5,880,777) discloses a solid state image pickup device with horizontal and vertical addition means.

b. Kawamura (U.S. Patent 6,185,270) discloses a solid state image pickup device, wherein the transfer gate has a plurality of control gates that extend in parallel in the horizontal direction, the control gates crossing the plurality of vertical charge transfer paths.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Heather R Long whose telephone number is 703-305-0681. The examiner can normally be reached on Mon. - Thurs.: 7:00 am - 4:30 pm, and every other Fri.: 7:00 am - 3:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Andrew Christensen can be reached on (703) 308-9644. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

HRL
April 29, 2004

NGOC-YEN VU
PRIMARY EXAMINER